

Statement of
Donald W. Jones
Vice President, RCF Economic and Financial Consulting

Economic Aspects of Nuclear Fuel Reprocessing

July 12, 2005

U.S. House of Representatives
House Science Committee
Subcommittee on Energy

Good morning, Madame Chairwoman, Ranking Member Honda, and Members of the Energy Subcommittee of the House Committee on Science. I am Dr. Donald W. Jones, Vice President of RCF Economic and Financial Consulting. Our firm, headquartered in Chicago, conducts analysis of energy and environmental issues, as well as other economic topics. Together with Dr. George S. Tolley, Professor Emeritus of Economics at The University of Chicago, I co-directed a study conducted at The University of Chicago, entitled "The Economic Future of Nuclear Power." Our study was published in August 2004, and was funded by the U.S. Department of Energy. My prepared statement today is based on the findings of our study. I ask that our study be submitted for the record.

I have been asked by the Subcommittee to focus on the economic aspects of nuclear fuel reprocessing. In addition, the Subcommittee identified the following questions that should be specifically addressed:

1. Under what conditions would nuclear fuel reprocessing be economically competitive with the open fuel cycle and with other sources of electric power? What major assumptions underlie your analysis?
2. How would a decision to reprocess affect the economic future of nuclear power in the U.S.?

The financial model developed in our study projects that, in the absence of federal financial policies aimed at the nuclear industry (e.g., loan guarantees, accelerated depreciation, and investment or production tax credits), the first new nuclear plants coming on line will have a levelized cost of electricity (LCOE, i.e., the price required to cover operating and capital costs) that ranges from \$47 to \$71 per megawatt-hour (MWh). This price range exceeds projections of \$33 to \$41 for coal-fired plants and \$35 to \$45 for gas-fired plants. Our assumptions for new nuclear plants included accepted ranges of capital costs (\$1,200 to \$1,800 per kW overnight costs), with a 3 percent risk premium on loans and equity, and seven-year estimated construction time. We found that capital cost is the single most important factor determining the economic competitiveness of nuclear power. After first-of-a-kind engineering costs are paid and construction of the first few nuclear plants has been completed, there is a good prospect that lower LCOEs can be achieved that would allow nuclear to be directly competitive in the marketplace (without subsidies). For fossil generation, the assumptions included conservative (low) ranges of capital and fuel costs. Recent increases in coal and gas prices will raise LCOEs for coal-fired and gas-fired plants. In the long term, the competitiveness of new nuclear

plants would be markedly enhanced by policies that required fossil-fired plants to control greenhouse gas emissions.

Our projected costs for new nuclear plants included nuclear fuel costs estimated at \$4.35 per MWh. This estimate included the cost of raw uranium ore, its conversion, its enrichment, and the cost to fabricate the nuclear fuel. An additional \$1 per MWh was included for the nuclear waste fee. The on-site storage cost was estimated to be about \$0.10 per MWh. Thus, the total nuclear fuel cycle cost, assuming direct disposal, is less than ten percent of overall LCOE for the first few nuclear plants. The back-end costs are estimated to be even a smaller percentage, about two percent of the cost of electricity.

Our study also examined the costs of reprocessing spent nuclear fuel. We used publicly available estimates: estimates reported by Nuclear Energy Agency; work done at Harvard University, under the auspices of Mathew Bunn et al., “Project on Managing the Atom;” and work done by Simon Lobdell, “The Yucca Mountain Repository and the Future of Reprocessing.” NEA estimated that reprocessing costs were about \$2.40 per MWh, Bunn et al.’s estimate is about \$1,000 per kilogram of heavy metal or about \$2.65 per MWh, and Lobdell’s estimate is about \$2.80 per MWh. Thus, the average of these estimates is about \$2.65 per MWh, which still represents a small percentage of the LCOE, about 5%, for the first new nuclear plants. The study did not include the added fabrication costs with recycling plutonium and uranium, or any net costs beyond the levelized cost estimates for an advanced reactor to consume the remaining actinides.

While the first new nuclear plants would not be competitive with fossil generation without some form of temporary assistance, reprocessing would have little influence on the assistance required to make it competitive. If carbon sequestration were to be required for fossil-fired generation, even the first new nuclear plants, with reprocessing, would be competitive.

To summarize, reprocessing would not be an important economic influence on the competitiveness of new nuclear plants under current regulatory and fuel-price circumstances. In addition, as pointed out in our study, there are broad policy issues that will more likely influence the choice to pursue reprocessing and more advanced fuel cycles than the economic factors.

Thank you very much Madame Chairwoman and Subcommittee Members. This concludes my statement, and I would be pleased to answer any questions you might have.